

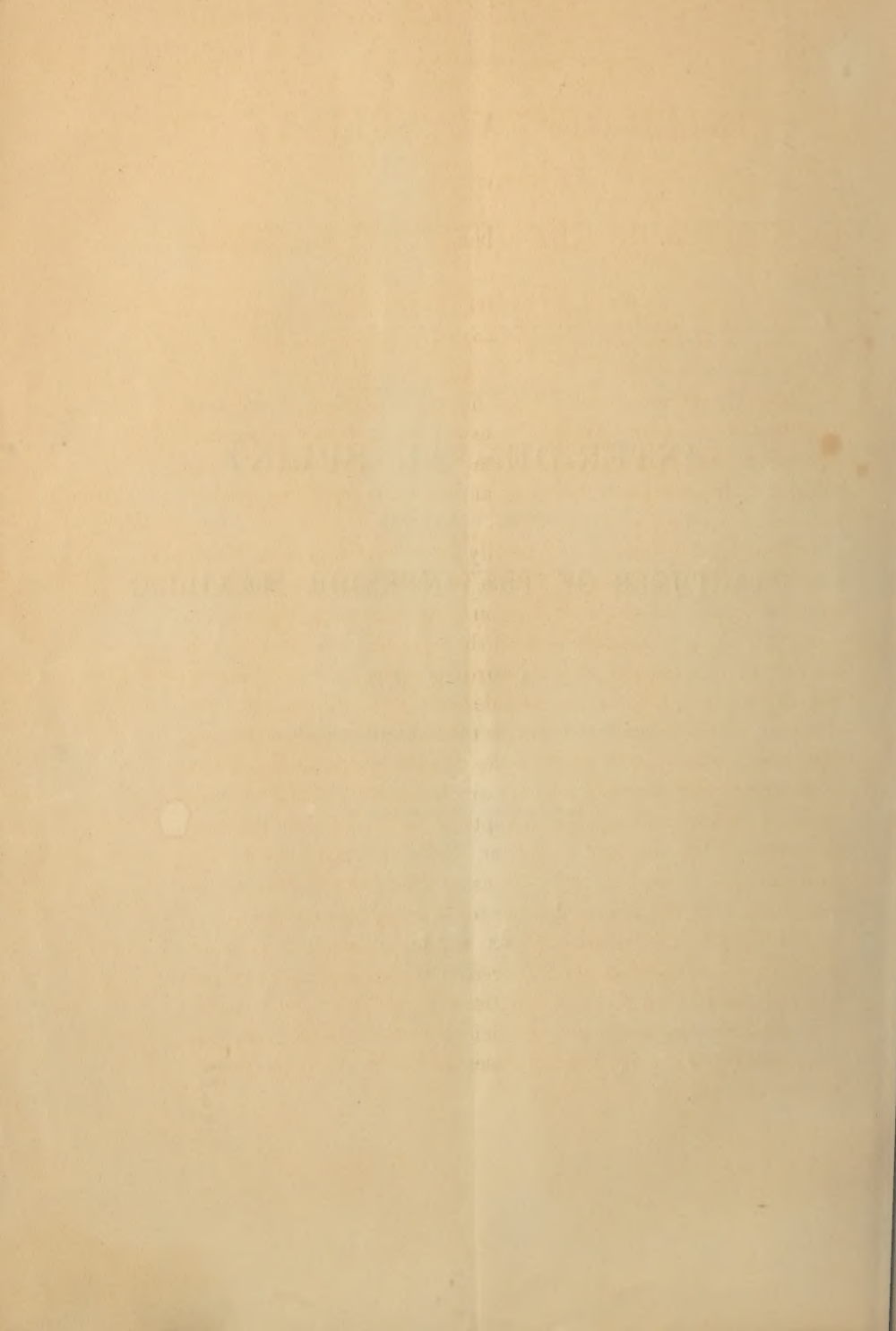
1869 III

BY

Resident Physician St. Louis City Hospital.

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INTER-DENTAL SPLINT

FOR TREATING

FRACTURES OF THE INFERIOR MAXILLA.

BY E. A. CLARK, M.D.,

Resident Physician St. Louis City Hospital.

The great difficulty experienced by every surgeon in treating fractures of the lower jaw, with most of the ordinary apparatus now in use, has been such that I feel assured the method I have to present will not be regarded as an intrusion upon the profession.

I should feel reluctant—especially after the degree of favor shown some of them by such men as Boyer, Malgaigne, Erichsen, Fergusson, and others, as well as our own successful experience in certain cases—to assert that all the appliances in use at the present day for treating this fracture, are useless, or in every case unsuccessful; but after considerable experience with most of them, varied according to the peculiar circumstances attending each case, I cannot but consider the cases very few to which any of them are well adapted. There are too many coincident conditions necessary in each case, adapting the fracture to the construction of the apparatus, rather than the apparatus to the conformation of the fracture. In cases where there is but slight displacement of the fragments, the teeth complete and evenly arranged in both jaws, with sufficient of them absent, at a point where their resistance is not required to maintain the proper position of the jaw, to allow the patient to receive nourishment, some of these appliances are as efficient as could be desired, but unfortunately there are but few cases in which all these conditions exist.

Where there is considerable displacement in the fracture, and the opposing teeth in the opposite jaws are irregular or wanting on either side, and where all the teeth in front are complete so as to prevent the patient taking food while the jaws are clasped together, the apparatus of Gibson, Barton and Hamilton, all of which act upon the same principle, with a sling bandage passing beneath the jaw and over the top of the head, and another bandage passing in front of the chin to extend around the back of the head, are objectionable. This latter bandage, especially in a fracture of the body of the bone on both sides, must evidently have the effect to increase the displacement by drawing the anterior arch backward, thus increasing the already existing tendency of the inferior maxillary muscles in that direction, while the sling bandage, by clasping the jaws firmly together, not only prevents the possibility of the patient taking food into the mouth if the teeth are complete in both jaws in front, without removing the dressing every time he wishes to eat, but, also, if there be certain irregularities of the teeth in either or both jaws, the displacement may not only not be corrected, but actually increased when the jaws are clasped together in this manner. For instance, if the fracture be through the body of the bone, and the teeth entirely wanting in the posterior fragment, and perhaps the opposing teeth deficient in the upper jaw, the sling bandage, in clasping the jaws together, will force the posterior fragment higher than the anterior, thus maintaining the displacement, or even proportionally increasing it; while again, if the teeth should be complete in the posterior fragment and deficient in the anterior, the traction of the sling bandage would reverse the displacement and raise the anterior arch higher than the posterior fragment. Besides, the dressing is constantly liable to become displaced.

Many of these objections, however, do not apply to Dr. Hamilton's apparatus, which is constructed of a leather sling bandage passing beneath the chin, with a band attached to its anterior edges, which passes in front of the chin, and preventing the sling bandage from slipping back against the front of the neck, obviates the danger of drawing the anterior fragments backwards, while the sling being fixed upon the head by horizontal straps

passing around the forehead and vertex, prevents the danger of the dressing becoming displaced. In cases where there are no teeth deficient at a point through which the patient may be fed, Dr. Hamilton recommends that a single gutta percha splint be laid upon the crowns of the teeth on each side, leaving an open space for admission of food in front. This apparatus commends itself to us as probably the most practicable heretofore in use, but nevertheless would, we think, be deficient in correcting the displacement in case of certain irregularities of the teeth in the superior maxilla, or in case of a fracture at the symphysis.

Wire sutures attaching the fractured surfaces have been, and are still used in some cases with a good degree of success; but where the fracture is simple and occurs far back, the sutures are difficult to apply, and in many cases excite an inflammation of the gums and increased salivation, which renders the method objectionable, or even impracticable; besides, in order to make the fracture secure, in many cases it will be necessary, in addition, to apply the sling bandage, thus claspings the jaws together so as to prevent the patient taking food.

The ligature thrown around the teeth adjacent to the fracture on either side, as practised first by Hippocrates, and subsequently by Chelius, Miller, Cooper, and others, has been very justly ignored by Malgaigne and Gibson. The method is objectionable; in the first place, because there may be no teeth to which the ligature can be attached, or if any, they may be decayed, and become painful by the pressure of the ligature; while again, the teeth frequently become loosened, and, if previously sound, are caused to decay; besides, where there is any considerable degree of displacement, the ligature is not sufficient to maintain the fracture in position without the aid of the sling bandage. Ligatures applied in this manner almost always excite inflammation of the gums, with increased salivation.

The silver clasp invented by Dr. Mütter, consisting of a plate made so as to cover the crowns and sides of the first two teeth adjacent to the fracture on either side, is objectionable, not only on account of its expense, but the great difficulty of fitting such a plate sufficiently accurate to retain the fragments in position,

which it certainly would not do where there was much displacement, without the aid of the sling bandage, as in case of the ligature attached to the teeth.

Various interdental splints have been devised for treating this fracture, as those of Fergusson and Miller, consisting of a simple piece of ivory or cork placed between the teeth, but this appliance is too unsteady and easily displaced to rely upon. Gibson, Syme and Erichsen wholly ignore the method as impracticable.

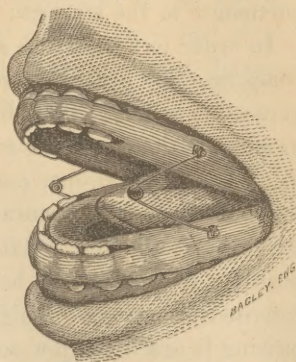
Various modifications of interdental, connected with sub-mental splints, with clamps connecting the two, have been devised for treating fractures of the jaw. The first, probably, of these was by Rutenick, in the year 1799, and consisted of a silver plate, made so as to fit the crowns and sides of the teeth adjacent to the fracture, to which hooks were attached, which passed out of the mouth to be screwed into a wooden splint constructed so as to fit the jaw upon its external and under surface. This apparatus has been variously modified by Hauzalot, Malgaigne, Lonsdale, and others, whose success with its application is not such as to commend the method as practicable; as, in almost all the cases recorded by these gentlemen, the appliance was so painful that the patients could not endure it long; or, where it was borne for any length of time it produced abscesses under the jaw, while Malgaigne asserts that the apparatus is constantly liable to slip forward and become displaced.

Philip S. Wales, Surgeon U. S. Navy, has more recently invented an apparatus somewhat similar to the above, consisting of a dental and sub-mental plate, made of gutta percha, with a flattened wire attached to the dental splint, and passing out of the mouth, bent over the lip at a right angle, to be inserted in a mortice in the sub-mental splint in front of the symphysis, and fixed at a given degree of pressure by a thumb screw in the outer plate of the mortise, the sub-mental splint being fixed more firmly to the jaw by a strap passing beneath it, and buckled over the top of the head in front of the ears. This apparatus is more practical than any other of the kind with which we are familiar, from the fact that the two splints are moulded so as to fit the parts accurately, and thus correct any irregularity caused from the teeth

in the inferior maxilla, while the sub-mental plate can be so accurately fitted to the external surface of the jaw that it would not be so likely to cause injury to the soft parts; though the strap passing over the top of the head for the purpose of binding the splint to the jaw is objectionable—yet unavoidable—from holding the jaws clasped together, and preventing the patient's taking food or drink.

The interdental splint illustrated by the following wood cut is relieved of many disadvantages of the appliances I have just mentioned, while, at the same time it is both simple and cheap.

The two dental splints are made of vulcanized gutta percha, so as to conform accurately to the shape of the teeth in both jaws, or where there are no teeth, or some of them are wanting, to the alveoli, in such a manner as to prevent the possibility of any lateral displacement in the fragments. Where the teeth are perfect, the plates need only fit upon the crowns and side of the teeth with-



out coming in contact with the gums at all. The splints that I have used were manufactured for me by Dr. Homer Judd, a most excellent practical dentist, of this city, by the same process that an impression of the jaw is taken in plaster of Paris, for plates intended for artificial teeth. In taking the impression for the lower jaw, the plate filled with plaster being placed in position upon the teeth, both hands of the operator placed beneath the jaw, forces the fragments into position, where they are held until the plaster becomes sufficiently firm to preserve the cast. From these casts the gutta percha splints are moulded, and subsequently vulcanized. The gutta percha thus prepared has such a degree of firmness that the plates can be made very light and delicate, allowing a part of the teeth to project through the surface of the plates, thus fixing the splints more firmly. Previous to vulcanizing the plates four small pivots are inserted into them, two on either side, opposite the last bicuspid teeth.

To these pivots the ends of the triangular spiral springs are hooked so as to admit of motion upon the pivots. These triangular springs are made of brass wire one-sixteenth of an inch in thickness, the spiral portion being formed of two turns of the wire at the anterior, angular or central portion, while the ends project backwards to the extent of an inch, to be attached to the pivots on the outer sides of the splints, so that when the plates or splints are in position, as shown in the diagram, these springs, (the spiral portion of which projects slightly in front of the angles of the mouth,) force the inferior maxilla downwards, with a force proportionate to the strength of the springs.

In order to adjust the splints properly, the springs should be compressed by grasping the plates between the thumbs and fingers so as to insert them between the jaws, and place them in proper position upon the crowns of the teeth, then force the fragments into their proper position, when the inferior plate will be found to fit the jaw accurately, which it will not do until the bone is properly adjusted. After the plates and fracture are once in position, the mouth will be forced wide open by the action of the interdental springs. This is counteracted by a sling bandage passing beneath the jaw and over the top of the head, forcing the jaws in such proximity as to leave a sufficient space between them in front so as to enable the patient to take food and drink, and at the same time allow him to talk so as to be understood distinctly, while he is also enabled to expectorate without difficulty. The amount of space that will exist between the plates in front will depend upon the amount of force necessary to be used by the sling bandage, and which should be just sufficient to place the fragments in their proper axis. If the force required for this purpose should be greater than the resistance of the springs in any given case, and force the plates in contact with each other, the springs should be removed and replaced by stronger ones. Another difficulty existing in the apparatus of Gibson and Barton is obviated in this appliance, i. e., instead of drawing the anterior fragment backwards, in which direction it is already displaced to some extent in fractures of the body of the bone, the interdental springs, when compressed by the sling bandage, have a tendency

to push the anterior arch forwards. While, by keeping the inferior maxilla depressed by the force of the springs, the sub-mental muscles are in a measure relaxed, and the tendency to displacement downwards and backwards of the anterior fragment is diminished. Indeed, the principle involved in the apparatus is to substitute these two plates for the jaws, the former of which being entirely under our control by means of the interdental springs, so that just as we control the splints so do we control the jaw, while, at the same time, the force exerted is operating upon the entire surface of both maxillæ at the same time, thus adapting the apparatus to fractures occurring at any point of the jaw that can be reached by the material necessary to secure a cast of the fragments, regardless of the absence or irregularities of the teeth or the character of displacement of the fracture.

